PRE- AND POSTOPERATIVE MYOCARDIAL AND BLOOD POOL SCANS IN A CASE OF LEFT VENTRICULAR ANEURYSM: CASE REPORT

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Myocardial perfusion scans (using ^{131}Cs) and blood pool scans (^{113m}In) were performed on a patient before and after resection of a left ventricular aneurysm. Although the huge aneurysm was revealed by preoperative scans, preservation of a significant mass of myocardium was evident. Postoperative scans show the reconstructed heart and the amount of residual damage. The operative findings confirmed the reliability of the scan information.

The development of a ventricular aneurysm is a serious complication of myocardial infarction. Although accurate diagnosis has usually depended on cardiac catheterization and angiography, it now can be achieved noninvasively by means of gated cardiac blood pool scanning (*1*). Preoperative assessment of the surgical risk remains difficult, however, even by catheterization studies (*2*). Better definition of the site and extent of the myocardial infarct, as well as an estimate of the amount of remaining viable myocardium (*3*), might therefore contribute significantly to surgical indication.

Myocardial imaging using intravenous injection of a potassium analog (^{43}K, ^{81}Rb, ^{131}Cs, ^{129}Cs, ^{201}Tl) offers a new approach to this problem since the scan obtained at rest reflects the mass of viable myocardium (*4–6*).

The following case report illustrates an approach using combined myocardial and blood pool scanning in a patient with a left ventricular aneurysm and compares the pre- and postoperative scintiscans with the anatomic findings.

CASE REPORT

A 48-year-old man was admitted to the hospital following an acute episode of chest pain. The diagnosis of extensive anterior myocardial infarction was made from enzyme tests and electrocardiograms. Functional recovery was unsatisfactory since the patient complained of dyspnea on minor exertion. During the next few months, fluoroscopy demonstrated the development of an aneurysmal dilatation of the left ventricular apex. Ten months following the myocardial infarction, examination revealed a resting tachycardia of 100/min and a blood pressure of 100/70 mm Hg. A chest radiograph showed a globally enlarged cardiac silhouette with an aneurysmal dilatation of the left ventricular apex. Paradoxical systolic outward motion was noted at fluoroscopy.

Two hours after intravenous injection of ^{131}Cs (1.4 mCi) myocardial scanning was performed with a Picker Magnascanner 500 (collimator 2114B). The patient was scanned in the anterior and 45-deg left anterior oblique projections, with the detector passing as close as possible to the chest wall. The blood pool scan was performed in the anterior projection 10 min after the injection of 2.5 mCi of stabilized ^{113m}In.

The cesium scintiscan performed before surgery showed a large anteroapical defect on the anterior projection (Fig. 1). The remaining myocardium has a crescent-like shape but is poorly separated from the hepatic activity. In the left anterior oblique projection a peripheral band of activity is preserved, and the defect appears as a central cold area that measures approximately 9 × 10 cm. The cardiac blood pool scan, anterior projection, shows the heart, the great vessels, and the left ventricular aneurysm with its collar. With external anatomic markers for spatial reference, the left ventricular aneurysm can be superimposed over the cold area of the anterior myocardial scan.

Coronary arteriography demonstrated a normal right coronary artery. The left circumflex coronary artery was opacified and its caliber normal, but the

Received April 8, 1975; original accepted April 17, 1975.

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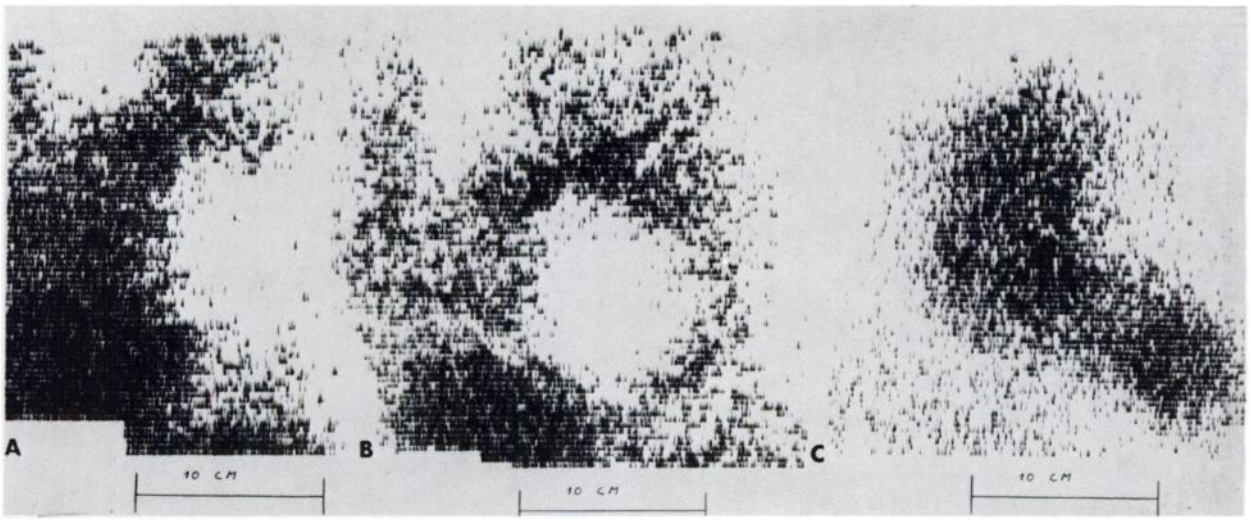

FIG. 1. Anterior (A) and 45-deg left anterior oblique (B) ^{131}Cs myocardial scans and anterior blood pool scan (C) done before surgery. Scale for each is 10 cm. Large anteroapical defect is clearly seen although separation from hepatic activity is disappointing. Blood pool scan is distorted by presence of large aneurysm.

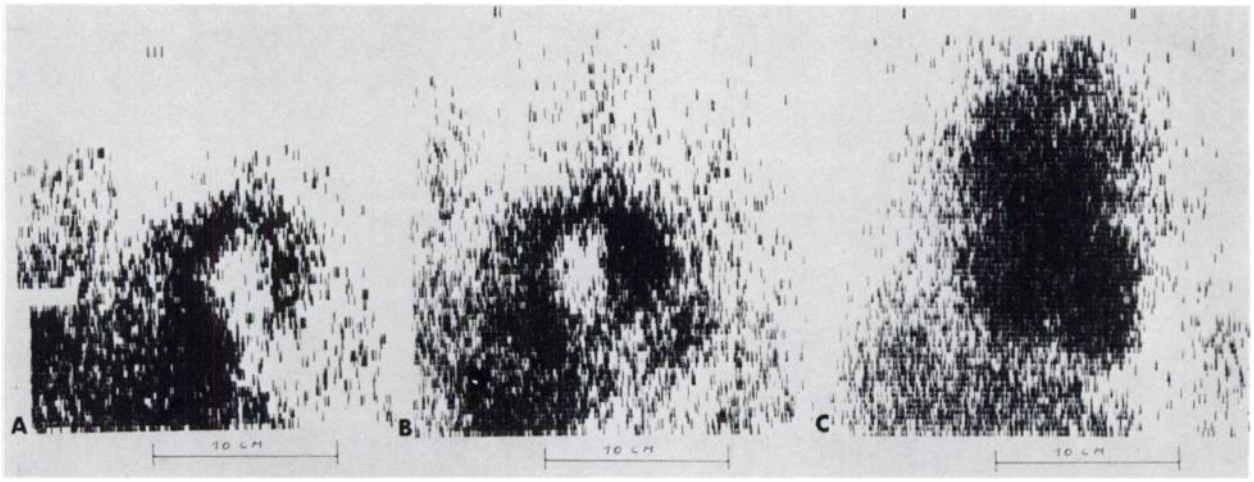

FIG. 2. Anterior (A) and 45-deg left anterior oblique (B) ^{131}Cs myocardial scans and anterior blood pool scan (C) done after surgery. Scale for each is 10 cm. There is no evidence of aneurysm and global heart size is considerably reduced. Area of residual scar persists in anteroapical region, but note its greatly decreased size.

marginal branch was 70–90% obstructed. The left anterior descending coronary artery showed multiple 70% narrowings and a total occlusion beyond the origin of the first diagonal branch.

At surgery the left ventricular aneurysm appeared as a large hemispheric dilatation of the anteroapical wall and comparable in size to the ventricular cavity itself. It was resected with most of the infarcted tissue. The size of the collar after excision was approximately 8 cm in diameter. The patient did well, with improved functional capacity. A myocardial scan taken after surgery (Fig. 2) demonstrated a persistent lateral cold area, but it was considerably smaller than in the study done before surgery. The cardiac blood pool scan showed normalization of the cardiac volume and no evidence of the aneurysm.

DISCUSSION

The present report illustrates the combined use of cardiac blood pool and myocardial scans in a patient with a myocardial aneurysm (*5*). Gated cardiac blood pool scanning clearly detects ventricular aneurysm, as well as lesser degrees of wall motion abnormality, and its reliability has been established by comparison with angiography (*1,7*). Conventional ungated scanning can also detect ventricular aneurysm when the deformation of the ventricular silhouette persists during diastole (*5,8*).

Myocardial scanning with a potassium analog depicts the mass of viable myocardium (*4*) while the uptake in areas of scar or of ischemic myocardium is diminished (*9*). In a patient with left ventricular aneurysm, the myocardial scan alone is not diagnostic of this abnormal pattern of left ventricular contraction (*10*). It portrays, however, the amount of residual myocardium that will have to carry on cardiac function. This information might possibly help in separating surgical from nonsurgical candidates. A recent report (*2*) has documented the poor prognostic value of preoperative angiographic and hemodynamic analysis in patients with left ventricular aneurysm; accordingly such an index based on the amount of remaining myocardium should be evaluated prospectively.

In the present study, myocardial scanning was performed with ^{131}Cs. While this tracer has the same biologic properties as ^{129}Cs and shares many of the properties of the other potassium analogs, its low-energy emission (a 30-keV x-ray) makes it difficult to use in imaging. Contribution from the posterior portion of the heart is markedly diminished by absorption. While this characteristic diminishes the value of the ^{131}Cs scan in studies of the heart as a whole, it may enhance the resolution of an anterior defect, as in the present case. The currently available ^{43}K, ^{81}Rb, or ^{201}Tl are better tracers and should be substituted; nevertheless, the present case remains as an indication of what can be achieved.

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